SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

   BE IT KNOWN THAT I, YOSHIKO MARUYAMA, a
citizen of Japan residing at Kanagawa, Japan have
invented certain new and useful improvements in

  PRINTING SYSTEM, PRINTING APPARATUS AND TERMINAL
   APPARATUS EMPLOYED IN PRINTING SYSTEM, AND
      PRINTING METHOD

of which the following is a specification:-

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to printing systems, printing apparatuses and terminal apparatuses employed in printing systems, and printing methods. The present invention relates more particularly to a printing system where a plurality of printing apparatuses are connected via a network and usage of the printing apparatuses is restricted, and a printing apparatus and a terminal apparatus employed in such a printing system. The present invention also relates more particularly to a printing method employed in such a printing system.

2. Description of the Related Art

As more apparatuses are connected via a network in an office, a variety of users can now access printing apparatuses. Under these circumstances, several methods of restricting usage of the printing apparatuses have been proposed. According to these methods, the access right of each user or an amount of use of each printer by each user can be set in each printing apparatus so that restriction can be imposed on usage of each printing apparatus.

Japanese Laid-Open Patent Application No. 8-314648 discloses a printing apparatus including a storage part storing the access right of a user to the printing apparatus and the recording conditions

5 (marginal conditions) of the user so as to restrict the recording output of the print data of the user.

Japanese Laid-Open Patent Application No. 9-282120 discloses a print control apparatus that controls an access of a user to a printer by

10 determining whether a user is accessible to an object for printing based on access control information attached to the object.

Japanese Laid-Open Patent Application No. 10-161823 discloses a printing system that sets the

15 authority of a user to use a printer apparatus for each function thereof in a database and determines whether the user is authorized to use the printer with respect to each function based on information included in a print request from the user and the

20 usage authority thereof set in the database.

However, according to the conventional methods, it is often a manager of apparatuses (including printing apparatuses) that sets the access right of each user, so that the users are prevented

25 from being informed immediately of changes in their

access rights. Further, if the number of sheets that each user can use is restricted, a printing apparatus is prevented from performing printing any further when the number of sheets used by a user reaches the

5   upper limit. In these cases, it is only after requesting a print job to be executed that each user is informed whether she/he is authorized to use the printing apparatus.

10   SUMMARY OF THE INVENTION

It is a general object of the present invention to provide a printing system, a printing apparatus and a terminal apparatus employed in the printing system, and a printing method in which the

15   above-described disadvantage is eliminated.

A more specific object of the present invention is to provide a printing system that informs a user of a printing apparatus of any change in her/his authority to use the printing apparatus

20   when the change is effected, and informs the user of the authority to use the printing apparatus by making an inquiry about the usage authority of the user when a terminal apparatus is activated or before the user requests a print job to be executed so as to

25   eliminate a failure in printing caused by executing

the print job without the authority to use the printer.

Another more specific object of the present invention is to provide a printing system that enables printing to be performed by modifying printing conditions even if a user does not have authority to use all the functions of a printing apparatus.

Yet another more specific object of the present invention is to provide a printing apparatus, a terminal apparatus, and a printing method employed in such printing systems.

The above objects of the present invention are achieved by a printing system including a printing apparatus, a terminal apparatus for transmitting and receiving information, a notification part notifying a user of the printing apparatus of information on authority of the user to use the printing apparatus, and a network connecting the printing apparatus, the terminal apparatus, and the notification means so that information transmission and reception in the system is performed through an electrical signal via said network.

Additionally, in the above-described printing system, the notification part may notify the

user of a change in the authority of the user to use the printing apparatus when the change is effected.

Thereby, the user is informed of the change in her/his authority to use the printing apparatus immediately when the change is effected. Therefore, a failure in printing caused by executing a print job without the authority to use the printer can be eliminated.

The above objects of the present invention are also achieved by a printing apparatus including a central processing unit controlling an operation of the entire printing apparatus, and a notification part notifying a user of the printing apparatus of information on authority of the user to use the printing apparatus.

The above-described apparatus is suitable for the above-described system.

The above objects of the present invention are also achieved by a terminal apparatus including a central processing unit controlling an operation of the entire terminal apparatus, an inquiry part transmitting an inquiry as to whether a user of a printing apparatus has authority to use the printing apparatus, and a presentation part presenting the user with a result of the inquiry.

The above-described apparatus is suitable for the above-described system.

The above objects of the present invention are also achieved by a printing method including the steps of (a) setting authority of a user of a printing apparatus to use the printing apparatus; and (b) notifying the user of information on the authority of the user to use the printing apparatus through an electrical signal via a network.

Additionally, in the above-described system, said step (b) may notify the user of a change in the authority of the user to use the printing apparatus when the change is effected.

Thereby, the same effects as those of the above-described system can be produced.

The above objects of the present invention are further achieved by a storage medium including a program for printing, the program causing a computer to execute the steps of (a) setting authority of a user of a printing apparatus to use the printing apparatus, and (b) notifying the user of information on the authority of the user to use the printing apparatus through an electrical signal via a network.

Additionally, in the above-described storage medium, said step (b) may notify the user of a change

in the authority of the user to use the printing

apparatus when the change is effected.

Thereby, the same effects as those of the

above-described system can be produced.

5

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages of

the present invention will become more apparent from

the following detailed description when read in

10 conjunction with the accompanying drawings, in which:

FIG. 1 is a block diagram showing a

configuration of a printing system according to

embodiments of the present invention;

FIG. 2 is a block diagram showing a

15 configuration of another printing system according to

the embodiments of the present invention;

FIG. 3 is a functional block diagram of a

printer according to a first embodiment of the

present invention;

20 FIG. 4 is a flowchart of an operation of the

printer of the first embodiment;

FIG. 5 is a functional block diagram of the

printer according to a second embodiment of the

present invention;

25 FIG. 6 is a functional block diagram of a

usage authority inquiry part of a user terminal apparatus according to the second embodiment;

FIG. 7 is a flowchart of an operation of the printer of the second embodiment;

5   FIG. 8 is a flowchart of an operation of the user terminal apparatus of the second embodiment;

FIG. 9 is a flowchart of an operation of the user terminal apparatus of the second embodiment;

FIG. 10 is a functional block diagram of the

10   user terminal apparatus according to a third embodiment of the present invention;

FIG. 11 is a flowchart of an operation of the user terminal apparatus in a case of modifying printing conditions based on usage authority of a

15   user; and

FIG. 12 is a flowchart of an operation of the user terminal apparatus in a case of the user modifying the printing conditions by her/himself.

20   DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A description will now be given, with reference to the accompanying drawings, of embodiments of the present invention.

FIGS. 1 and 2 are diagrams showing

25   configurations of printing systems according to the

embodiments of the present invention.

Each of the systems of FIGS. 1 and 2 is composed of a user terminal apparatus 1 that makes a request for printing, a print server 2 that provides a printing function to the user terminal apparatus 1, a printer (a printing apparatus) 3, and a network 4 connecting the user terminal apparatus 1, the print server 2, and the printer 3.

The printer 3 of FIG. 1 includes image output devices (printers) 3a through 3c, and the printer 3 of FIG. 2 includes image output devices (printers) 3a and 3b.

The system of FIG. 2 includes a usage authority management system 5 provided external to the printer 3. The usage authority management system 5 manages authority of users to use the printer 3. The usage authority management system 5 may only be connected to the image output device 3b so that the image output device 3b may access the usage authority management system 5 to obtain information therefrom as required, or may be connected to a local area network (LAN) via the network 4 so that the user terminal apparatus 1 and the print server 2 may directly access the usage authority management system 5. In each of the systems of FIGS. 1 and 2,

information transmission and reception is performed through an electrical signal via the network 4.

In the following description, the printer 3 refers to any of the image output devices (printers)

5   3a through 3c for convenience of description.

The user terminal apparatus 1 includes a central processing unit (CPU) controlling the operation of the entire user terminal apparatus 1, a memory, a storage device such as a hard disk drive

10   (HDD) storing information obtained from the printer 3, a display for showing information to a user, an input-output device such as a keyboard, and a communication device performing communications via the network 4.   Each function of the user terminal

15   apparatus 1 is realized by the CPU reading a program from the memory and executing the program.

The printer 3 includes a central processing unit (CPU) controlling the operation of the entire printer 3, a memory, an input-output part, and a

20   communication part performing communications via the network 4. The printer 3 may include a storage device such as a hard disk drive (HDD) and/or a display for showing information to the user. Each function of the printer 3 is realized by the CPU

25   reading a program from the memory and executing the

program.

[First Embodiment]

Next, a description will be given of a first embodiment of the present invention. This embodiment focuses on a case where an apparatus (printer), when there is a change in authority of a user to use the apparatus, informs the user of the change.

A printing system according to this embodiment is equal in configuration to any of the systems of FIGS. 1 and 2.

FIG. 3 is a functional block diagram of the printer 3 according to the first embodiment.

The printer 3 includes a print job reception part 31 that receives a print job transmitted from the user terminal apparatus 1 or a print job transmitted by way of the print server 2, a print job analysis part 32 that analyzes the received print job (print conditions), a print job control part 33 that controls a print operation, a usage authority management part 34 including a usage authority table 35 and a user information table 36, a usage authority change notification part 37 that notifies a user, when the authority of the user to use the printer 3 is newly set or changed, of the setting or change, an operation part 38 for setting the usage authority of

the user and printer management parameters, and a
main control part 39 managing the parts (modules) 31
through 34, 37, and 38.

FIG. 4 is a flowchart of an operation of the
5   printer 3 according to this embodiment.

In step S1, the printer 3 determines whether
a printer manager has input information on the usage
authority of a user through the operation part 38 or
the network 4.   If information on the usage authority
10   of a user has been input (that is, "YES" in step S1),
in step S2, the printer 3 records the input usage
authority information in the usage authority table 35.
If the user has her/his usage authority information
already recorded, the printer 3 replaces the recorded
15   information with the input information.

Next, in step S3, it is determined whether
the printer manager has input information on the user.
If information on the user has been input (that is,
"YES" in step S3), in step S4, the printer records
20   the input user information on the user information
table 36, or updates the user information table 36.
In the case of "NO" in step S3, step S5 is performed.

Then, in step S5, the printer 3 obtains a
notification (contact) mail address of the user from
25   the user information table 36, and in step S6, causes

the usage authority change notification part 37 to
inform the user of the new entry of its usage
authority or the change in the recorded contents of
the usage authority.

5   In this embodiment, the usage authority
management part 34 having the usage authority table
35 and the user information table 36 and the usage
authority change notification part 37 are provided in
the printer 3, but may be provided in the print
10 server 2 of FIG. 1 or in the external usage authority
management system 5 of FIG. 2. That is, any of the
systems of FIGS. 1 and 2 may be employed in this
embodiment.

         According to the system of the first
15 embodiment, the user is automatically informed of a
change in her/his authority to use the printer 3 when
the change is effected. Therefore, the user is
prevented from selecting a printer that the user is
not authorized to use, thus eliminating a failure in
20 printing caused by executing a print job without the
authority to use the printer. The user is also
allowed to delete the printer that the user is not
authorized to use from a list of registered usable
printers. Further, the user can also be informed
25 automatically of the introduction of the printer 3

into the system when the printer 3 is introduced into the system.

[Second Embodiment]

Next, a description will be given of a
5   second embodiment of the present invention. This embodiment focuses on a case where a user (client) transmits an inquiry to an apparatus (printer).

A printing system according to this embodiment is equal in configuration to any of the
10 systems of FIGS. 1 and 2.

FIG. 5 is a functional block diagram of the printer 3 according to the second embodiment of the present invention. In FIG. 5, the same elements as those of FIG. 3 are referred to by the same numerals,
15 and a description thereof will be omitted.

In addition to the configuration of FIG. 3, the printer 3 of FIG. 5 includes an HTTP (Hypertext Transfer Protocol) processing part 40 that performs processing in compliance with the HTTP to receive an
20 inquiry transmitted from a user by the HTTP and respond to the inquiry, an XML (Extensible Markup Language) analysis part 41 that analyzes the inquiry coded in XML, and an XML response preparation part 42 for returning information on usage authority of the
25 user in response to the inquiry.

        FIG. 6 is a functional block diagram of a
usage authority inquiry part 14 that is incorporated
into the user terminal apparatus 1.

        The usage authority inquiry part 14 includes
5   an XML creation part 11 that creates an inquiry about
the usage authority of the user by using XML, an XML
analysis part 12 that analyzes a response coded in
XML from the printer 3 and obtains information on the
usage authority of the user, and an HTTP processing
10 part 13 that performs processing in compliance with
the HTTP to communicate with the printer 3 by using
the HTTP.

        FIG. 7 is a flowchart of an operation of the
printer 3 according to this embodiment.

15   In step S11, the printer 3 determines
whether there is a communication by the HTTP. If
there is a communication by the HTTP (that is, "YES"
in step S11), in step S12, the printer 3 performs
processing in compliance with the HTTP.

20   Next, in step S13, the printer 3 determines
whether the communication is coded in XML. If the
communication is coded in XML (that is, "YES" in step
S13), in step S14, the printer 3 analyzes the XML
communication. In the case of "NO" in step S13, step
25 S18 is performed.

Then, in step S15, the printer 3 determines whether the communication is an inquiry about information on the usage authority of the user. If the communication is an inquiry about information on

5 the usage authority of the user (that is, "YES" in step S15), in step S16, the printer 3 obtains the usage authority information from the usage authority table 35. In the case of "NO" in step S15, step S17 is performed. In step S17, the printer 3 prepares a

10 response of the obtained information by using XML. In step S18, the printer 3 returns the response to the user terminal apparatus 1 by the HTTP.

FIG. 8 is a flowchart of an operation of the usage authority inquiry part 14 of the user terminal

15 apparatus 1 in the case of the user inquiring about the usage authority thereof according to this embodiment.

After the user terminal apparatus 1 is activated, in step S21, the usage authority inquiry

20 part 14 of FIG. 5 creates an inquiry about the usage authority of the user by using XML to the printer 3 registered as a printer to be used. Then, in step S22, the user terminal apparatus 1 transmits the inquiry to the printer 3 by using the HTTP.

25 In step S23, when the user terminal

apparatus 1 receives a response coded in XML from the printer 3, the usage authority inquiry part 14 analyzes the XML response and obtains information on the usage authority of the user. Then, in step S24,

5   the user terminal apparatus 1 compares the obtained usage authority information with usage authority information of the user stored in the usage authority table 35 or the HDD to see whether there is any change from the stored usage authority information of

10   the user. If there is any change (that is, "YES" in step S24), in step S25, the user terminal apparatus notifies the user of the change by using a pop-up screen, and stores the newly obtained usage authority information in the usage authority table 35.

15   FIG. 9 is a flowchart of another operation of the usage authority inquiry part 14 of the user terminal apparatus 1 in the case of the user inquiring about the usage authority thereof according to this embodiment.

20   After the user terminal apparatus 1 activates a printing application, in step S31, the usage authority inquiry part 14 of FIG. 5 creates an inquiry about the usage authority of the user by using XML to the printer 3 selected as a printer to

25   be used. Then, in step S32, the user terminal

apparatus 1 transmits the inquiry to the printer 3 by using the HTTP.

In step S33, when the user terminal apparatus 1 receives a response coded in XML from the printer 3, the usage authority inquiry part 14 analyzes the XML response and obtains information on the usage authority of the user.

In step S34, the user terminal apparatus 1 determines whether the user has authority to use the printer 3 based on the obtained user authority information. If the user does not have usage authority for the printer 3 (that is, "NO" in step S34), in step S36, the user terminal apparatus 1 provides the user with a notification to that effect by displaying a pop-up screen and stores the newly obtained information in the usage authority table 35. Then, in step S37, the user terminal apparatus 1 again displays a print dialogue or a printer selection screen, and in step S38, waits for the user to select another printer for printing. If the user has usage authority for the printer 3 (that is, "YES" in step S34), in step S35, the user terminal apparatus 1 makes a print request to the printer 3.

In this embodiment, the usage authority management part 34 having the usage authority table

35 and the user information table 36 and the usage

authority change notification part 37 are provided in

the printer 3, but may be provided in the print

server 2 of FIG. 1 or in the external usage authority

5   management system 5 of FIG. 2.

According to the system of the second

embodiment, the user is allowed to transmit the

inquiry about her/his authority to use the printer 3

from the user terminal apparatus 1. Therefore, the

10   printer 3 or the usage authority management system 5

(server) is free from managing a notification to the

user. Further, the inquiry about the usage authority

of the user is transmitted automatically to the

printer 3 when the user terminal apparatus 1 is

15   activated or before the printing request is

transmitted to the printer 3. This allows the user

to make the inquiry on her/his usage authorization

with reduced efforts.

[Third Embodiment]

20   Next, a description will be given of a third

embodiment of the present invention.

A printing system according to this

embodiment is equal in configuration to any of the

systems of FIGS. 1 and 2. Further, the printer 3

25   according to this embodiment is equal to the printer

3 of FIG. 5 of the second embodiment.

FIG. 10 is a functional block diagram of the user terminal apparatus 1 employed in the printing system of this embodiment.

5   The user terminal apparatus 1 of this embodiment includes a usage authority check module 50, a notification part 55, a substitute data creation part 56, and a print job management part 57. The usage authority check module 50 includes an HTTP

10   processing part 51, an XML creation part 52, an XML analysis part 53, and a usage authority determination part 54.

The usage authority check module 50 performs processing with respect to determination as to

15   whether the user has authority to use the printer 3. The HTTP processing part 51 performs processing in compliance with the HTTP to communicate with the printer 3 by the HTTP. The XML creation part 52 creates data to be transmitted to the printer by

20   using XML. That is, the XML creation part 52 creates an inquiry to the printer 3. The XML analysis part 53 analyzes information received from the printer 3. That is, the XML analysis part 53 analyzes a response coded in XML from the printer 3 and obtains

25   information on the usage authority of the user. The

usage authority determination part 54 determines,

based on the obtained usage authority information,

whether the user has authority to use the printer 3.

The notification part 55 presents the user

5   with a message based on a determination by the usage

authority determination part 54.   The substitute data

creation part 56 creates substitute data for

performing printing by only using functions that the

user is authorized to use if the user has authority

10   to use only a part of the functions of the printer 3.

That is, the substitute data is obtained by modifying

the printing conditions of the original print request.

The print job management part 57 cancels or executes

a print job.

15   In this embodiment, the HTTP is employed in

data communication between the printer 3 and the user

terminal apparatus 1.   However, a protocol employed

by the present invention is not limited to the HTTP.

Further, although an XML document is used for inquiry

20   about the usage authority of the user in this

embodiment, other methods may be used for the inquiry.

FIG. 11 is a flowchart of an operation of

the user terminal apparatus 1 in the case of

modifying printing conditions in accordance with the

25   contents of the usage authority of the user.

After the user terminal apparatus 1 activates a printing application, in step S401, the XML creation part 52 of the user terminal apparatus 1 creates an inquiry about the usage authority of the

5 user by using XML to the printer 3 selected as a printer to be used. Then, in step S402, the user terminal apparatus 1 communicates with the printer 3 by using the HTTP processing part 51 so as to transmit the inquiry to the printer 3.

10 In step S403, receiving an XML response from the printer 3, the user terminal apparatus causes the XML analysis part 53 to analyze the XML response, and obtains information on the usage authority of the user. Next, in step S404, the user terminal

15 apparatus 1 causes the usage authority determination part 54 to analyze the obtained usage authority information so as to determine whether the user has full authority to use the printer 3, that is, whether the user is authorized to use all the functions of

20 the printer 3.

If the user terminal apparatus 1 determines, as a result of the analysis, that the user does not have full authority to use the printer 3, that is, that the user is not authorized to use all the

25 functions of the printer 3 ("NO" in step S404), in

step S405, the usage authority determination part 54 further determines whether the user is authorized to use no functions or only a part of the functions.

If the usage authority determination part 54 determines in step S405 that the user is authorized to use no functions, in step S409, the notification part 55 presents the user with a message that printing is not permitted, and in step S410, the print job management part 57 cancels the print job.

If the usage authority determination part 54 determines in step S405 that the user is authorized to use only a part of the functions (printing conditions), in step S406, the notification part 55 asks the user whether the user agrees to modify the printing conditions, presenting the user with a message to that effect. If the user agrees to modify the printing conditions (that is, "YES" in step S406), in step S407, the substitute data creation part 56 creates substitute data for the printing conditions excluding functions that the user is not authorized to use. In step S408, the print job management part 57 requests the printer 3 to print the created substitute data and causes the printer 3 to perform the print job.

If the user does not agree to modify the

printing conditions (that is, "NO" in step S406), in step S409, the notification part 55 presents the user with a message that printing is not permitted, and in step S410, the print job management part 57 cancels

5   the print job.

Here, a description will be given, as a specific example of the above-described operation, of a case where color printing is performed.

If the user can use only monochrome printing,

10   the notification part 55 presents the user with a message such as "Color printing is not permitted. Perform monochrome printing instead?"

If the user agrees to modify the printing conditions, the substitute data creation part 56

15   creates substitute data that sets printing conditions for monochrome printing, and the print job management part 57 causes the printer 3 to perform the print job.

On the other hand, if the user does not agree to modify the printing conditions, or the user

20   is authorized to use neither color nor monochrome printing, the print job management part 57 cancels the print job.

Although the case of performing color printing is taken herein as an example, this case is

25   not the sole example of the application of the

present invention. For instance, the usage authority

may be set for the resolution and/or the sheet size

of the printer 3.

FIG. 12 is a flowchart of an operation of

5   the user terminal apparatus 1 in the case of the user

modifying printing conditions by her/himself.

Steps S501 through S505 are equal to steps

S401 through S405 of FIG. 11. If the usage authority

determination part 54 determines in step S505 that

10   the user is authorized to use no functions, in step

S512, the notification part 55 presents the user with

a message that printing is not permitted, and in step

S513, the print job management part 57 cancels the

print job.

15   If the usage authority determination part 54

determines in step S505 that the user is authorized

to use only a part of the functions (printing

conditions), in step S506, the usage authority check

module 50 informs a printer driver (not shown in the

20   drawing) that has created the print data of

conditions (of functions) that the user is not

authorized to use. When the printer driver receives

the information from the usage authority check module

50, in step S507, the notification part 55 presents

25   the user with this information by opening up a screen

of the property of the printer 3. At this point, the notification part 55 may notify the user of the functions that the user is not authorized to use by displaying the information in a different color.

5   Further, the notification part 55 may present the information to the user so that the user cannot select the functions that the user is not authorized to use. Thus, in step S508, the user is urged to modify and reset the printing conditions.

10   Then, in step S509, the user determines whether to execute the print job with the modified or substitute printing conditions. If the user determines not to execute substitute printing (that is, "NO" in step S509), in step S513, the print job

15 management part 57 cancels the print job.

        On the other hand, if the user determines to perform substitute printing within the range of the functions that the user is authorized to use (that is, "YES" in step S509), in step S510, the substitute

20 data creation part 56 creates substitute data based on the printing conditions reset by the user. In step S511, the print job management part 57 requests and causes the printer 3 to print based on the created substitute data.

25   In this embodiment, the usage authority

management part 34 having the usage authority table

35 and the user information table 36, and the usage

authority change notification part 37 are provided in

the printer 3, but may be provided in the print

5   server 2 of FIG. 1 or in the external usage authority

management system 5 of FIG. 2.

According to the system of the third

embodiment, the usage authority of the user may be

set for each of the functions of the printer 3. With

10   information on the usage authority of the user set

for each of the functions, a printing function can be

provided with finer control.

Further, printing is performable by creating

the substitute data based on the printing conditions

15   excluding functions (printing conditions) that the

user is not authorized to use. Thereby, printing can

be performed only with functions within the range of

the usage authority of the user even if desired

printing conditions include the functions that the

20   user is not authorized to use.

Therefore, this system is effective in such

a case where the user desires to print a document

anyway when the user wishes to use a color printing

function or a finisher function but has no usage

25   authorization therefor.

Further, the user is allowed to set
conditions for substitute printing by her/himself if
the user is not authorized to use all the functions
that the original printing conditions require or use.

5   Thereby, the user can set the printing conditions in
detail.

Further, the user is allowed to create
substitute data by modifying the original printing
conditions by using a part setting the printing

10   conditions. Thereby, the user is allowed to set
conditions for substitute printing by using the same
interface as used by the printer driver, for instance.
This requires only an I/F for notifying the printer
driver of functions that the user is not authorized

15   to use and a part presenting the user with the
functions that cannot be used in the user interface
part of the printer driver to be added to the system.
Therefore, it is not necessary to introduce a new
module for generating the substitute data into the

20   system, thus simplifying the printing system.

The present invention is not limited to the
specifically disclosed embodiments, but variations
and modifications may be made without departing from
the scope of the present invention.

25   The present application is based on Japanese

priority applications No. 2000-402703 filed on
December 28, 2000 and No. 2001-110579 filed on April
9, 2001, the entire contents of which are hereby
incorporated by reference.

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